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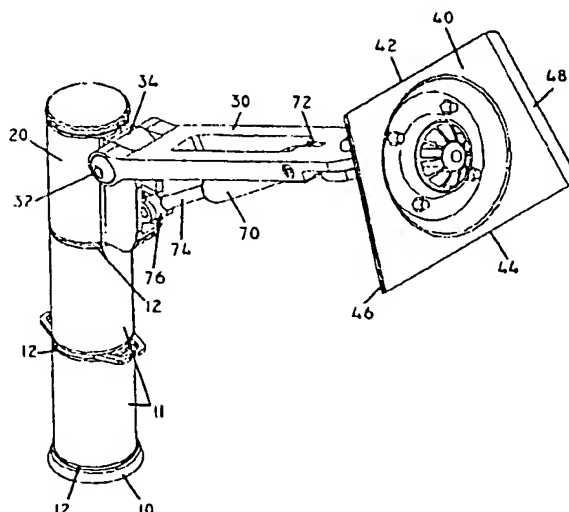
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(54) Title: SUPPORT ARM FOR VISUAL DISPLAY UNIT



(57) Abstract: A mounting arrangement for a planar VDU comprises a support base (10) which can be fixed to a support surface, spacer tubes (11) elevating a pivotable base (20) above the support surface and an arm (30) fixed to said base (20) through a hinge pin (32) and an air spring (70). The arm (30) supports a shaped channel plate (40) for holding the VDU when the VDU is attached to a complementary mounting bracket (not shown). The pivot base (20) can rotate 360° with respect to the support base (10) and the arm (30) can move in a vertical plane limited by the action of the air spring (70). The plate (40) is attached to the arm (30) by a pin pivot (72) and a ball and socket joint (74). The arm (30) and VDU maintain a steady position by reason of the dampening of the air spring (70) and the frictional loading applied to each of the joint components namely pin (32), and the pin pivot and ball and socket joint attaching the plate (40) to the arm (30).

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SUPPORT ARM FOR VISUAL DISPLAY UNIT

FIELD OF THE INVENTION

The present invention relates to a support arm for a visual display unit and in particular to a support arm for a flat video screen such as a LCD or plasma display screen.

5

BACKGROUND ART

In the prior art most visual display units (VDUs) are of the vacuum tube type although of recent times liquid crystal displays or plasma displays are becoming more prevalent. The latter screens are flat and are essentially planar devices compared with a vacuum tube display unit which is both heavy and of considerable depth. To mount VDUs on a support column or with a cantilever or articulated arm it is necessary to compensate for the weight of the visual display unit being supported as well as for any couple or moment which is created. As the arm is moved to suit the viewing of the VDU in a working or commercial environment, these parameters change and problems arise in maintaining a stable position for the arm.

10
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SUMMARY OF THE INVENTION

The present invention seeks to overcome problems or disadvantages in the prior art or to ameliorate them or to provide an alternative thereto.

20

According to the invention there is provided an apparatus for supporting a visual display unit including a support base, at least one pivot base rotatable with respect to said support base, an arm fixed to and pivotable with respect to said pivot base having means for dampening the motion of said arm and at a free end of said arm a mounting means for mounting a visual display device, said mounting means being pivotable with respect to said arm.

25

Preferably, the pivot base can be rotated through 360° with respect to said support base while said monitor arm can be raised or lowered through 110° in a vertical plane and said mounting means allows the visual display device fixed thereto to be rotated through 180° in the plane of the arm, plus or minus 40° in any other direction, and
5 360° about the longitudinal axis or roll axis of the arm. More than one monitor arm can be attached to the base and the height of the base can be adjusted to suit a given application. The monitor can be rotated 360° about the longitudinal axis or roll axis of the arm, for example to change from landscape to portrait position.

10 The arm is preferably supported by a gas spring and fixed to the pivot base by a pivot pin e.g. a nut and bolt arrangement. This support and fixing arrangement is damped to allow the arm to be maintained in equilibrium with movement of the arm.

Preferably, the planar display unit is readily removable from the support arm,
15 including the disconnection of any electrical attachments, by providing ready access thereto.

Preferably, the support base may be secured to a support surface for stability.

20 BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention will now be described with respect to the following figures in which:

Figure 1 shows in perspective view a first embodiment of a monitor arm
25 according to the invention;

Figure 2 shows a rear view of the mounting mechanism of Figure 1;

Figure 3 shows in perspective, a view of a bracket for use with the monitor arm of Figure 1;

Figure 4 shows the monitor arm supporting a planar monitor or visual display
30 unit;

Figure 5 shows an alternative arrangement for fixing the swivel head to the mounting plate for the mounting mechanism according to the invention; and

Figure 6 shows a further embodiment of the invention illustrating two monitor arms being supported by the support base.

PREFERRED MODES FOR PERFORMING THE INVENTION

5 Referring to Figure 1 the monitor arm support arrangement includes a support base 10, spacer tubes 11 with a pivot base 20 supported thereon, the pivot base 20 being rotatable through 360° with respect to the support base 10 by means of a bearing 12. An arm 30 is fixed by a pivot 32 to the post 34 extending from the pivot base 20. At the other end of the arm (see Figure 2) is attached a mounting plate 40 having open
10 ends 42, 44 and channelled sides 46, 48. The open end 44 is wider than the open end 42 creating a divergent channel between the sides 46, 48. The support base 10 may include means whereby it can be fixed, for example, removably, to a support surface (not shown) such as a desk, wall, floor, ceiling for stability, the fixing means being within the knowledge of a person skilled in the art.

15 The mounting plate 40 is attached to the arm 30 through two pivoting mechanisms, a swivel head 50 and a ball pivot 60. The swivel head 50 is fixed to the arm 30 by a pin pivot, for example nut and bolt, 52. The swivel head 50 is a flange having a stepped head 54 cut to allow the head 50 to rotate about the stepped end 56 of the arm 30. The
20 swivel head 50 can rotate through at least 180° in the plane of the monitor arm 30.

Attached to the stepped portion 54 of the swivel head 50 is a ball pivot 60 having a ball part 62 and a socket part 64 of a ball and socket joint. The socket 64 on the swivel head 50 mates with the ball 62 at the back 66 of the plate 40. The ball pivot 60
25 allows rotations of the plate 40 through the permitted angle of the ball pivot 60. Preferably, rotation through plus or minus 40° in pitch and/or yaw is provided for the mounting plate 40 with respect to the longitudinal or roll axis of the swivel head 50.

In addition to the bolt 32, the arm 30 is supported by a gas spring 70 fixed at one end
30 72 to the arm 30 and fixed at the other end 74 of the gas spring 70 to the post 34 near the join of the pivot base 20 to the spacer 11. The arm 30 is partially hollowed to accommodate the gas spring 70 and to reduce the weight of the arm. The other end 74

of the gas spring 70 is supported by a pivoting attachment 76 to accommodate movement of the arm 30 in a vertical plane through the arm 30. The pivoting attachment 76 can move vertically to adjust the angle, and hence the weight bearing characteristics, of the gas spring 70.

5

The gas spring 70 provides for damped movement of the arm 30. In addition, the friction provided by the bolt 32 and the bolt 52 provides respectively resistance to the motion of the arm 30 and the swivel head 50. The combination of these two factors allows the position of the plate 40 loaded by a panel display unit attached thereto to remain stationary or stable for any given position to which the arm 30 is moved.

10

Referring to Figures 3 and 4, a bracket 100 is shown allowing quick attaching and detaching of a planar monitor to the arm. A back plate 110 attaches the bracket 100 to a monitor 120 (see Fig.4) by fixtures 122 through holes 114. The bracket 100 has channels 102, 104 for sliding engagement on sides 46, 48 of mounting plate 40 with the separation of the channels 102, 104 matching the divergence of the sides 46, 48 (see Fig 4).

15

The back plate 110 is spaced from the channels 102, 104 by stepped portion 116 to provide clearance for accommodating cabling between the mounting plate 40 and the monitor 120. In addition, the back plate 110 has cut-out 112 for allowing access to attach or detach the plugs of a monitor 120 once on the bracket 100.

20

A lock 130 can be provided in the plate 40 to provide security for the monitor or planar visual display unit 120. The lock 130 has a tongue (not shown) which, when rotated to its locking position, engages in the slot 118 holding the mounting plate 40 and bracket 100 together.

25

The components of the bracket 100 and the monitor arm such as the support base 10, spacers 11, the pivot base 20, the arm 30, or the plate 40 can be made of any suitable material such as metal or plastics material, within the knowledge of a person skilled in the art. The bearing components 12 such as between spacer 11 and the pivot base 20

30

can be made of nylon and the components of the ball pivot 60 between the swivel head 50 and the plate 40 can be made of materials within the knowledge of a person skilled in the art.

- 5 The ball and socket joint as shown in Figures 2 and 4 is secured to the mounting plate 40 in any manner well known in the art, for example by fixtures 67, to the back 66 of the plate 40. An alternative arrangement is shown in Figure 5.

As shown in Figure 5, the back 66 of mounting plate 40 has a truncated conical fixture
10 150 to which the socket part 64 of the ball and socket joint or ball pivot 60 is attached. In the embodiment as shown in Figure 5, adjustable fixtures 152 are located about the periphery 154 of socket part 64 and secure the socket part 64 to the fixture 150. Springs or similar resilient elements 156 are positioned about each fixture 152 between socket part 64 and conical fixture 150. Fixtures 152 may be screws or bolts,
15 for example. Tightening or slackening of fixtures 152 against the restoring force of springs 156 allows adjustment of the pressure applied between the ball and socket components 62, 64 of the ball pivot 60 and thus of its frictional loading. Springs 156 also allow the pivot 60 to flex about directions within the plane of the plate 40 or of the planar VDU 120. This arrangement allows dampening of the motion of the pivot
20 60 and of the VDU held by the plate 40.

Springs 156 may be coiled springs or may be leaf springs. Other forms of resilient means are contemplated within the knowledge of a person skilled in the art.

- 25 More than one support arm 30 can be supported by the support base 10. Figure 6, for example, shows the situation where two support arms 30, 30' are provided, each attached to their respective pivot base 20, 20', including posts 34, 34', and supporting respective VDU 120, 120'. Each of the features of the two supporting arrangements 200, 220 is substantially identical to those of the embodiments described above with
30 respect to Figures 1-5. Each arm 30, 30' may support a VDU the same as the other or of a different size, weight or construction. The VDUs may face the same direction (as shown) or a different direction as required. The spacer means 11 may be used to

space the pivot bases 20, 20' from the support base 12 or may be used to space the pivot bases 20, 20' apart.

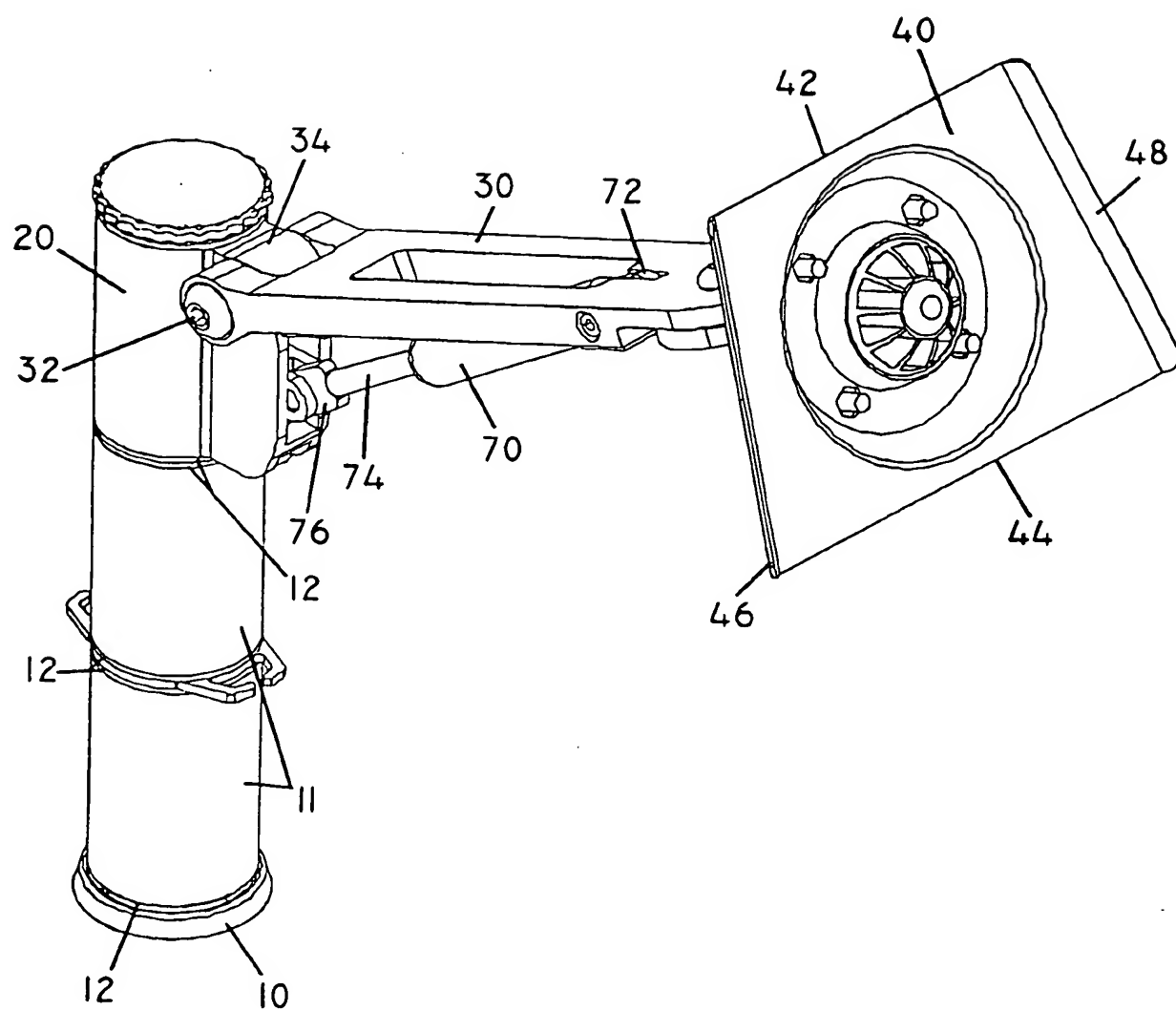
Although the invention has been described above with respect to preferred
5 embodiments thereof variations therein are contemplated within the knowledge of a
person skilled in the art. For example, in place of the gas spring 70 an oil filled
hydraulic cylinder or a metal coil spring may be employed.

CLAIMS

1. An apparatus for supporting a visual display unit including a support base, at least one pivot base rotatable with respect to said support base, an arm fixed to and pivotable with respect to said pivot base having means for dampening the motion of said arm and at a free end of said arm a mounting means for mounting a visual display device, said mounting means being pivotable with respect to said arm.
2. An apparatus for supporting a visual display unit as claimed in claim 1 wherein said pivot base is rotatable through 360° with respect to said support base and said arm is pivotable with respect to said pivot base in a vertical plane.
3. An apparatus for supporting a visual display unit as claimed in claim 1 wherein said mounting means is rotatable through 180° in the plane of said arm, plus or minus 40° in any other direction and 360° about the longitudinal axis of said arm.
4. An apparatus for supporting a visual display unit as claimed in claim 1 wherein a plurality of monitor arms are attached to said support base via respective pivot bases.
5. An apparatus as claimed in claim 1 wherein said pivot base is rotatable through 360° with respect to said support base, said monitor arm can be raised or lowered through 110° in a vertical plane, through said arm, said mounting means being rotatable through 180° in the plane of said arm, 360° about the longitudinal axis of said arm and plus or minus 40° in any other direction, wherein said arm is attached to said pivot base by pivot means and said arm is supported by a resilient means fixed between said pivot base and said arm, said resilient means and said pivot means allowing damped motion of said arm whereby said arm is maintained in equilibrium.
6. An apparatus for supporting a visual display unit as claimed in claim 5 wherein said pivot means is a pivot pin and said resilient means is a gas spring.
7. An apparatus for supporting a visual display unit as claimed in claim 5 wherein said mounting means is attached to said arm through a swivel head and a ball pivot, said swivel head allowing rotation of said mounting means about an axis vertical with respect to said mounting arm and said ball pivot allowing rotation of said mounting means in all directions about a point distal from said pivot base.

8. An apparatus for supporting a visual display unit as claimed in claim 7 wherein said mounting means includes a channel section.
9. An apparatus for supporting a visual display unit as claimed in claim 8 wherein said channel section includes a base portion, and a pair of upstanding non parallel side walls for supporting a mounting bracket to which is affixed said visual display unit.
10. An apparatus for supporting a visual display unit as claimed in claim 9 wherein said mounting bracket includes a back plate which attaches said mounting bracket to said visual display unit, a pair of non parallel channels for sliding engagement with said upstanding non parallel side walls of said mounting means, and respective joining portions spacing said channels of said mounting bracket from said back plate.
11. An apparatus for supporting a visual display unit as claimed in claim 10 wherein said mounting means is rigidly fixed to a component of said ball pivot.
12. An apparatus for supporting a visual display unit as claimed in claim 10 wherein said mounting means is resiliently fitted to a component of said ball pivot.
13. An apparatus for supporting a visual display unit as claimed in claim 12 wherein said component is the ball portion of said ball pivot and said mounting means is resiliently fitted to said ball portion by spring biased adjustable fixtures.
14. An apparatus for supporting a visual display unit as claimed in claim 12 wherein said visual display unit is a planar display screen.
15. An apparatus for supporting a plurality of visual display units including a plurality of pivot bases, each rotatable with respect to said support base and each having an arm, dampening means and mounting means as claimed in any one of claims 1-3, 5-14 for supporting respective ones of said plurality of visual display units.
16. An apparatus for supporting a visual display unit as claimed in any one of claims 1-14 further including spacer means for spacing said pivot means from said support base or from another pivot means.
17. An apparatus for supporting a plurality of visual display units as claimed in claim 15 further including spacer means for spacing said pivot means from said support base or from another pivot means.

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**Figure 1**

2/6

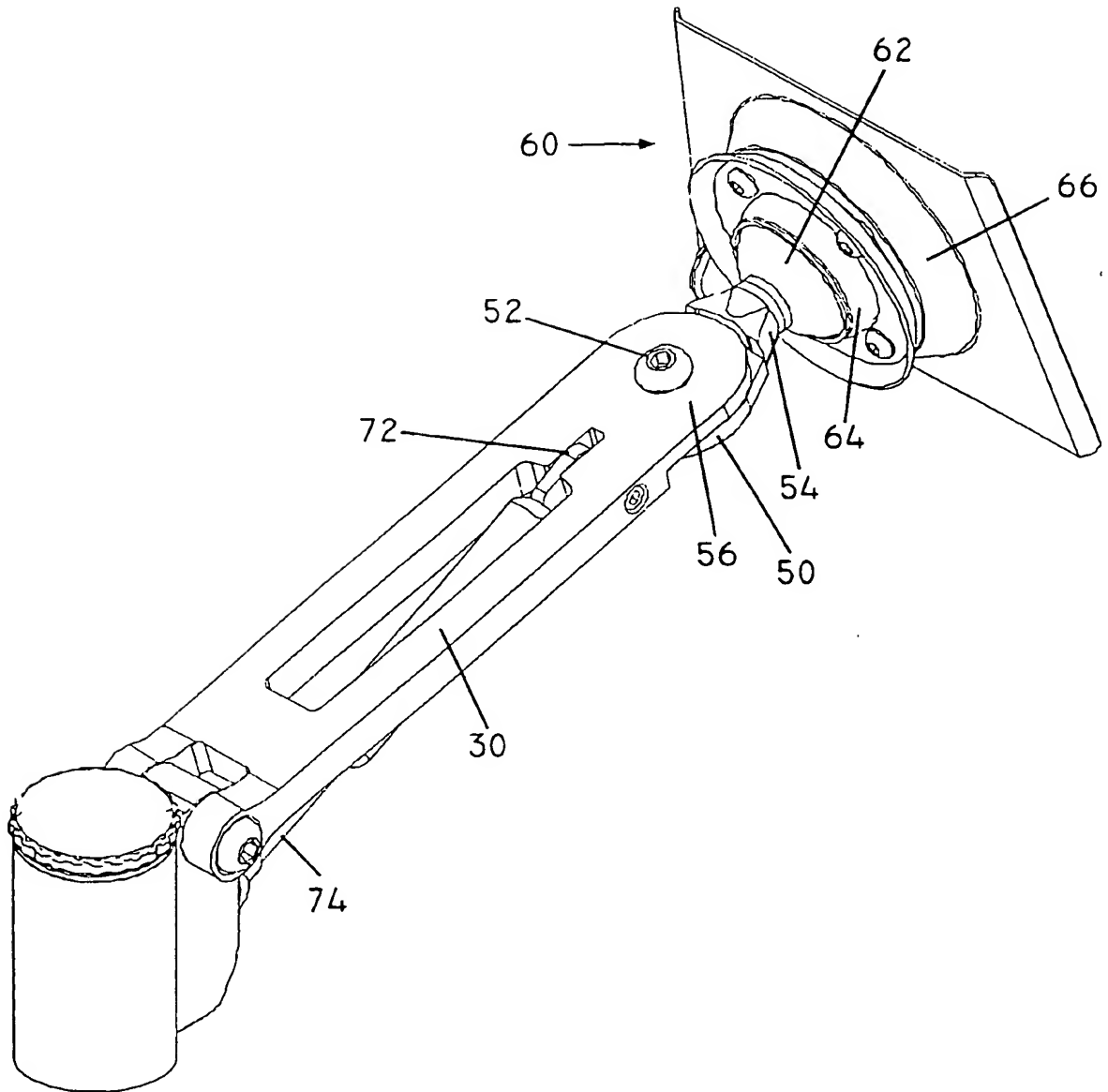


Figure 2

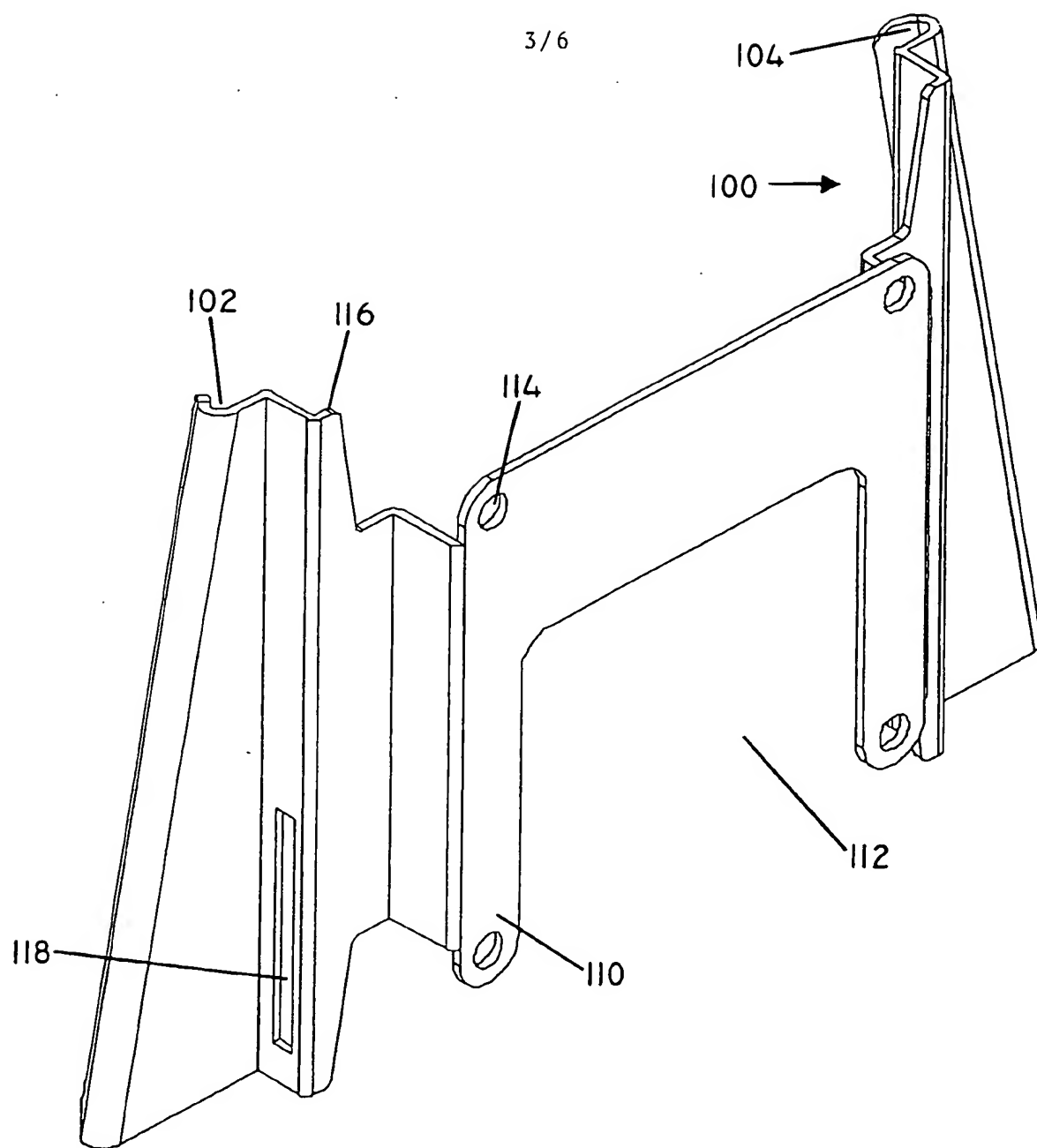


Figure 3

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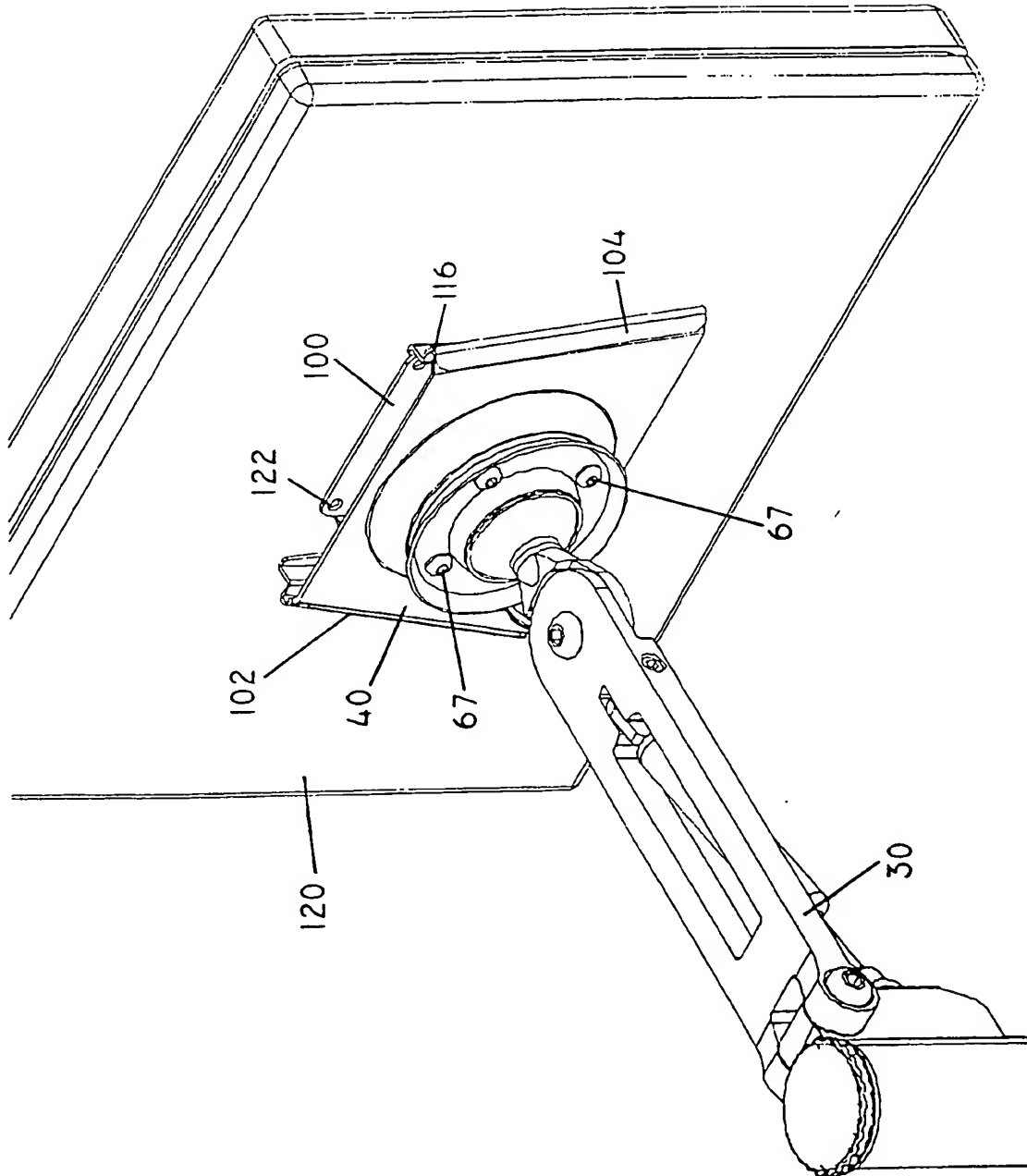
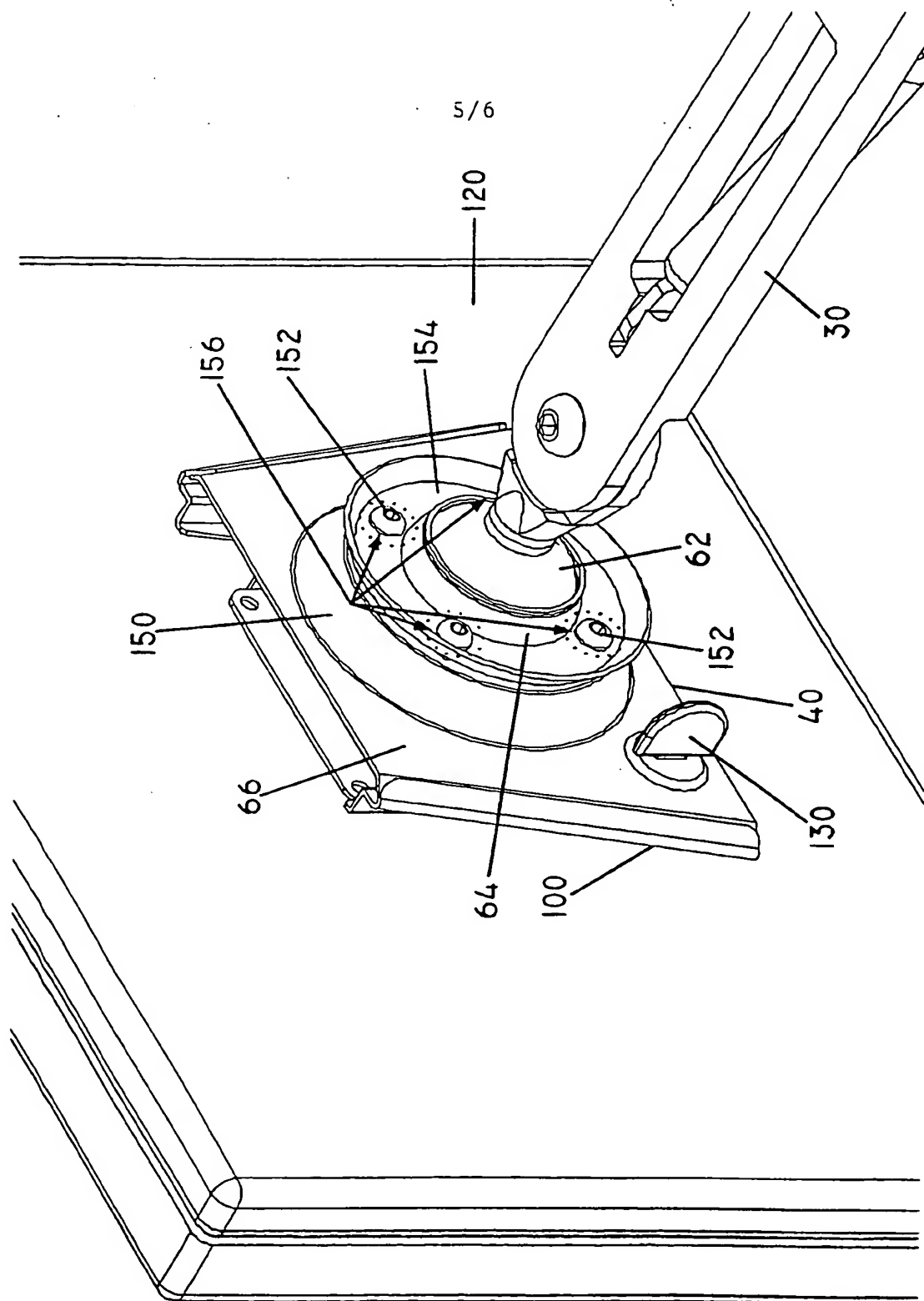


Figure 4

**Figure 5**

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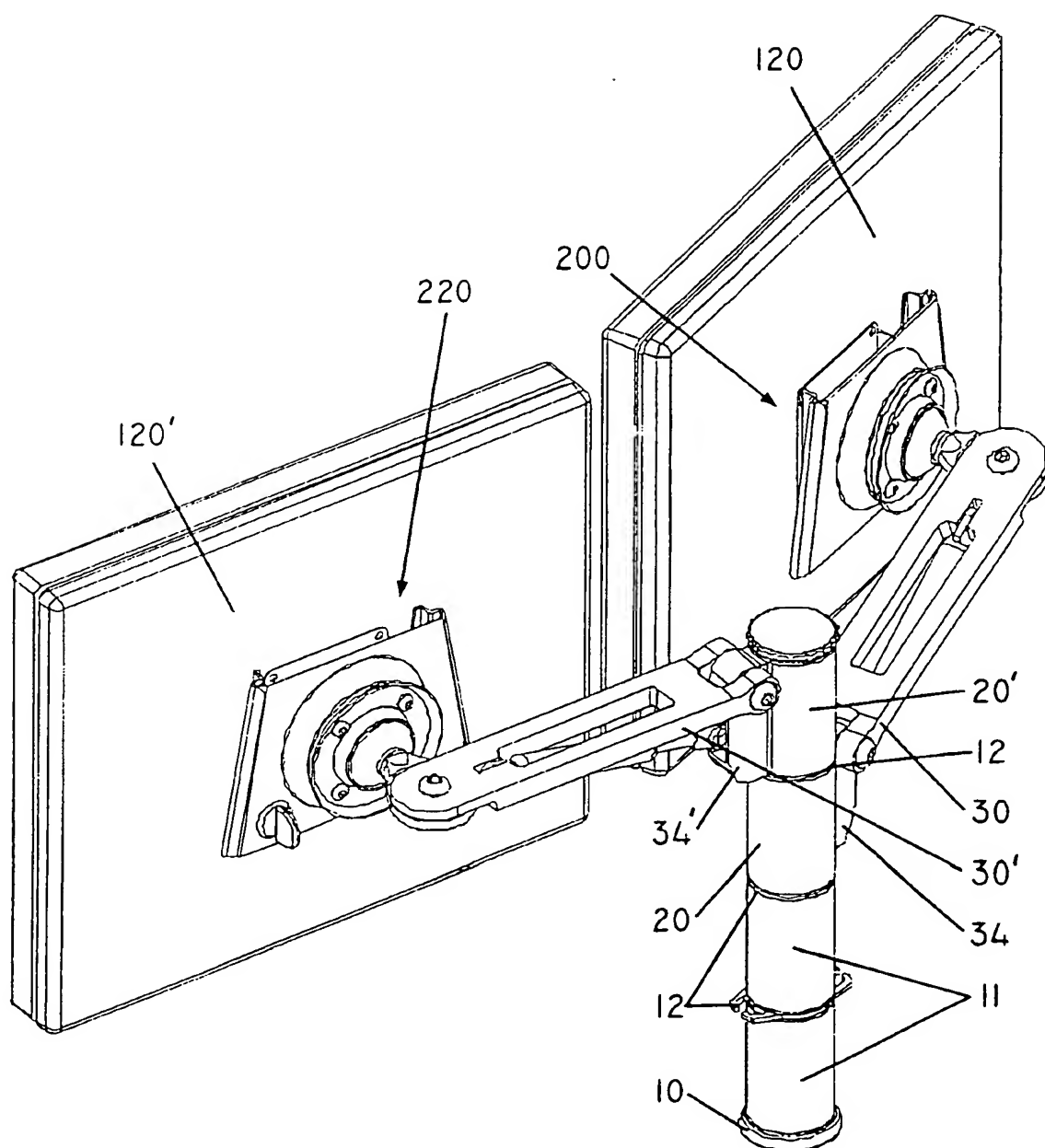


Figure 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/01388

A. CLASSIFICATION OF SUBJECT MATTERInt. Cl. ⁷: A47B 96/00, 97/00, H04N 5/64

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47B 96/00, 97/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPAT: (A47B or H04B or US Class 248) and (monitor or tv or screen or television or vdu) and (support or pillar or arm) and (pivot or rotate or ball or socket or swing)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97/46824 A (ERGOTRON INC) 11 December 1997 Entire document	1-17
P, X	US 6019332 A (SWEERE ET AL) 1 February 2000 Entire document	1-17
X	US 5751548 A (HALL ET AL) 12 MAY 1998 Entire document	1-17

☒ Further documents are listed in the continuation of Box C
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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

7 December 2000

Date of mailing of the international search report

12 DEC 2000

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/01388

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 723368 A (ERGOTRON INC) 24 July 1996 Entire document	1-17
X	US 5709360 A (ROSEN) 20 January 1998 Entire document	1-17
X	US 5505424 A (NIEMANN) 9 April 1996 Entire document	1-17

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/01388

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
WO	9746824	AU	62811/98	EP	901596	US	5842672
		US	6019332	US	5918841	US	5924665
		US	5947429	US	5967479	US	5992809
		US	6015120				
US	5751548	EP	807878	JP	10071037	US	5859762
		JP	10292896				
EP	723368	CA	2166375	JP	8317319	US	5876008
US	5709360	US	5667179				
US	5505424	NONE					
END OF ANNEX							



Application No: GB 0007806.3
Claims searched: 1-15

Examiner: J. C. Cowen
Date of search: 24 November 2000

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.R): A4L LAAJ, LAAL, LAAT, LAL; H4F FJH, FJL

Int CI (Ed.7): A47B 81/06

F16M 11/02, 11/04, 11/06, 11/08, 11/08, 11/10, 11/12, 11/14, 11/18

H04N 5/64, 5/655

Other: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0795716 A1 Mediwork - see abstract and figure 1	1 at least
X	EP 0105076 A Wang Laboratories - see abstract	1,2 at least
X	DE 19638388 A BMW - see figure and abstract	1,2 at least
X	US 5797568 Telefonica - see abstract and figure 1	1 at least
X	US 4585196 John Cormier - see abstract and figure 4	1 at least
X	US 4528597 Grundig E.M.V. - see claim 1 and figure 2	1 at least
X	US 3913880 Joseph A Lucasey - see figures 1,2 and key release mechanism 46,52,60	1,2 at least
X	JP 110151124 A Mimoto - see abstract and figure	1,2 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.